SCIENCE AND MECHANICS.

PHOTOGRAPHY IN COLORS.

THE VARIOUS SYSTEMS NOW IN VOGUE.

LIPPMANN'S AND LUMIERE'S "INTERFERENCE" PICTURES—COLLOTYPE AND HALF-TONE CHROMOS—IVES'S HELIOCHROMOSCOPE—R. D. GRAY'S RECENT LANTERN-SLIDE EXHIBITION.

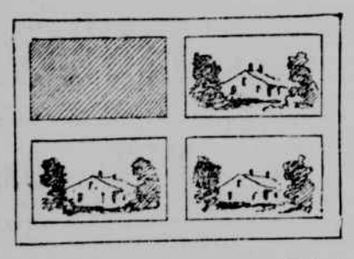
That which Professor Gabriel Lippmann, of Paris, accomplished in color photography was to make a picture in which there were iridescent hues, like those of mother-of-pearl, which become visible when the plate was held at certain angles to the light. Louis Lumière, another Frenchman, considerably improved on the original Lippmann process, but he retains the essence of it. Some of the rays of light which fall on the plate in taking a photograph pass through it. These are caught by a mirror and reflected back into the sensitive film. Interference between the two sets of rays produce the effects described. As yet the results are far from being satisfactory.

Rausonnet and Collen, the former an Austrian, and the latter an Englishman, as long ago as 1865 hit upon a different method of imitating color as well as form in photography. The first step in their process was the production of separate negatives, with screens representing the primary colors. In one plate, therefore, the red rays would be suppressed, and would not act on the chemicals in the plate; in another the yellow, and in a third the blue would be similarly stopped; and, theoretically, all tints which are mixtures would be controlled by the co-operation of two or three screens. Of course the negatives thus obtained would be in black and white, but the details would have differences in intensity. It was thought that the primary colors, artificially produced, might then be used in some manner with these negatives in a combination picture.

More than twenty years elapsed, though, before certain incidental difficulties in rendering plates sensitive to red and yellow light were sufficiently overcome to allow of any success in this direction. Dr. H. W. Vogel eventually removed these, and in 1886 Ulrich prepared three stones, on a lithographer's plan, for color-printing, each being impressed with a different negative, and crude imitations of the original coloring of the subject (landscape, oil painting, spectrum, or collection of fruit) were thus secured. This was an adaptation of the so-called "collotype" process. Our fellow-countryman, Kurtz, carried this operation further. With "half-tone" zinc etchings, made from the different negatives, he rendered it possible to secure colored composites on an ordinary printing-press, the paper being run through first with one plate with an ink of one color, and then with a second plate, and a second color, and so on.

Meanwhile Frederick E. Ives, of Philadelphia, was experimenting with the three-plate idea along a new line. He made "positive" transparencies from his negatives, placed orange yellow and blue glass in front of them, and so arranged them in a box that the pictures would merge into one. He invented a camera with which he could get his three negatives on one plate, and with one exposure, instead of taking them separately and in succession, and then he perfected an instrument which he named the "heliochromoscope" for exhibiting these composites. Only one observer at a time can look into this device, but from one triple negative, of course, numberless transparencies can be secured. Our first diagram shows the heliochromoscope.

With a set of pictures made into "slides," and with a magic lantern, it is possible to effect the combination on a screen before a large company. A New-York lens-maker, R. D. Gray, who has been attempting color photography for years with both the collotype process and the lantern-slide, gave a private view of some of this latter work a few days ago. He has found it necessary to employ screens of different hues from those of Mr. Ives. The latter uses orange, yellow and blue; Mr. Gray has four sets, for different requirements, but they are all modifications of red, green and blue. He fixes his three complementary slides in a holder like that shown in our second diagram, the fourth



space being empty, and glass screens of the right color are placed between the respective slides and the light in his lantern. The three are then projected on the screen, and by very delicate adjustment united there.

In the camera the effect of the red screen is to stop the green light; and on the negative thus made, therefore, the rest of the lights and shades are normally recorded, but the greens do not affect the sensitive film, which, when washed, is transparent in these places. In the operation of making a slide from this plate, the positive is strongly impressed opposite these transparent places and becomes opaque. Hence, in the lantern, red (derived from the red glass behind the slide) is imparted more or less freely to most of the picture, but is effectually withheld where there were greens in the original subject. In like manner, in the slide made with the aid of a green screen those portions in which there was any red in the original become opaque; and from the colored glass in the lantern more or less green shines through the remaining portions of it. By the blue (or violet-blue) screen, yellow is prevented from affecting the third negative; and on the slide the yellow is turned into black. The color is restored, however, in the three-fold projected picture by the co-operation of red and green from the other two slides. Since Helmholz upset the old ideas about the three "primary" colors, it has been known that yellow is a product of green and red. In his collotype work, Mr. Gray uses ink of a color complementary to, and not identical with, that of the screens employed in securing negatives.

These screens are made of white glass coated with dyes, to the selection of which Mr. Gray has devoted much study and experiment. In some of his earlier work he employed liquids, confined between transparent films of some sort; but these are inconvenient to handle, though in some respects preferable to stained glass. In photographing down in the red end of the solar spectrum, some astronomers especially sensitize their plates for red and yellow by chemical treatment. Mr. Gray does not. With a red screen, therefore, he finds an exposure several hundred times longer than with a violet-blue screen necessary.

COPYING SCULPTURE BY MACHINERY.

A FRENCHMAN'S INVENTION FOR SAVING LABOR IN REPRODUCING STATUARY.

Amateur and professional draughtsmen are familiar with the instrument called a "pantagraph," by means of which it is possible to reproduce, on a larger or smaller scale, any drawing which a person has before him. By means of a simple lattice-work, pinned to the table, every motion made with a pencil point inserted in one part of the frame is imitated with mathematical exactness by another pencil.

Something of the same sort, but on a more elaborate scale, has now been applied to sculpture. A French maker of statues for churches, M. Delin, has invented apparatus by means of which he can shape a block of stone into a rough copy of a finished figure. He has the two marbles placed upright on revolving horizontal tables, which are so connected as to rotate simultaneously and with very precise agreement. A sculpturing tool, operated by electricity, is suspended from the ceiling before the block to be cut, and fixed in such a way that it advances and recedes in unison with a tracer, in the workman's hand, held before the model. The tables on which the figures stand may be raised or lowered together at the operator's will, and thus it is possible to reach every portion of the mass under the graver. The machine is intended to perform only the rougher work of the studio, and not to dispense entirely with finished touches by the hand of a true artist. M. Delin's invention is adapted to enlarging or reducing, as well as to copying.

CREMATING GARBAGE AT THE FAIR.

THE EFFICIENCY, ECONOMY AND SANITARY ADVANTAGES OF THIS SYSTEM.

City authorities in England have more thoroughly mastered the art of disposing of garbage than those in America. For sanitary and other reasons, destruction by fire is considered more desirable than other methods; and crematories for city waste are to be found in all the principal English towns. The subject is receiving wide attention in this country, however, and the report, recently published, on the workings of this plan on the grounds of the World's Fair at Chicago, will therefore possess much interest.

The rubbish, refuse from stores and restaurants, street sweepings and excreta from privies, was first forced into tanks at a sewerage station and treated with chemicals. The liquid portion was then drained off and allowed to run into the lake, and the solids were compressed by machinery into cakes that were carted to the furnaces. This latter stuff, called sludge for convenience, contained about 58 per cent of moisture and 42 per cent of dry matter. The oily, fibrous and foecal material, which was combustible, amounted to only 18 per cent, and the rest was ashes, earth, lime and other mineral products. Most of the waste paper about the grounds had been separately disposed of. Dead animals, from the size of a rat to that of a camel, were included in the garbage, and none of these was too large to go into the furnace door without cutting.

The fuel employed at the crematory was oil, broken into spray, and the flame was drawn downward so as to lave the matter lying on the grate-bars, which were of interlocked fireclay brick. Underneath was a receptacle for the ashes. All the gases and smoke passed from the first combustion chamber into a second one, where the products of the former were thoroughly consumed. The discharge from the chimney, therefore, was a thin, colorless, inoffensive gas, which was utterly imperceptible a few yards away. A feature of the plant at Chicago not always to be found elsewhere is this "fume cremetor," which makes the operation inoffensive.

The character of the garbage at Jackson Park, says the engineer in charge, W. S. MacHarg, was not what it would be under a regular municipal regime. By sorting out the ashes and selling them for filling low grounds, a double economy would be effected. By proper screening, much other valuable material could be separated. Further, there is a chance of getting phosphoric acid out of the ashes, and this could be sold for fertilizing, and the heat of combustion could be utilized with a steam boiler in some sort of municipal work. Some of the English "destructors," Mr. MacHarg says, are actually self-supporting. The work in Jackson Park cost, for fuel and labor, about 60 cents per ton. In five months about 5,732 tons were destroyed. The largest day's work called for the disposal of 21¾ tons of sludge-cake and 38¼ tons of other garbage.

THE TROLLEY FOR CANALS.

FURTHER DISCUSSION OF MINOR QUESTIONS INVOLVED IN THE IDEA.

The attempt to use electricity for propelling canal boats near Rochester was a distinct success; but technical journals regard it rather as a popular exhibition than such a scientific test as would determine all the questions involved in this great enterprise. These, in view of the importance of moving great quantities of bulky freight cheaply, are now receiving careful consideration from competent persons.

"The Electrical Engineer," for instance, calls attention to the extra resistance offered by shallow water to the passage of boats, and the increase in the required power, in a geometrical ratio, for every increase attained in speed. Hence that paper urges that the canals of New-York State be deepened to nine feet without delay.

In "The Engineering News" it is suggested that a flexible cord or cable should be substituted for a stiff pole, to bring the current down from the trolley wheel, to the motor in the boat. This would make it easier to maintain connection with the supply wire when the boat drifts sideways. The belief is expressed, moreover, that two wires may prove unnecessary, and that the return current can be handled by sending it into the water through a suitable "ground" plate in the bottom of the boat. Still another idea brought forward by "The Engineering News" is that the motor might be so constructed as to ride on the overhead wire (or cable), and to take hold thereof so as to tow the boat. This would involve more expensive overhead construction, but it would render a screw propeller unnecessary, and, although the latter device is already made to work fairly well by steam power on craft of this character, there are objections to it that have not been overcome. If a screw must be used, though, a large one, moving slowly, or twin screws, which could be smaller and more easily submerged, are considered desirable. The extra cost incident to the employment of special tugs, instead of motors on each boat, is deprecated by experts.

Another point needing consideration and experiment is the feasibility of "turnouts" for boats meeting and passing each other. On street railways it is easy to have the cars meet at specified points, but whether boats can be run on a schedule or not is quite a different question. Whether one, two or four overhead wires are necessary is yet undecided.

ELECTRIC LIGHTING WITH LESS HEAT.

Part of the energy conveyed to an incandescent electric lamp is wasted in the form of heat. This latter is radiated by the white-hot filament and transmitted to the outer air by the glass globe. If the glass could be made a poorer conductor of heat than it is now, then this loss would be reduced, and a given current would produce more light. "The Pharmaceutical Era" declares that a German chemist has succeeded in producing glass which, while transparent, is virtually impervious to heat. This is a rather incredible statement; but if it be true, a reform in one kind of electric lighting will be thus promoted. The incandescent lamp is not so economical at present as the arc-lamp, although for certain uses it is more convenient. But if the new glass, which is said to be composed of sodium hydrate, sand and kaolin, truly answers the description which is given of it, it will increase the efficiency of the former system and enable it to compete more advantageously with the latter.

AN INTERESTING DISCOVERY.

SALTS OF COPPER REDUCED TO PURE METAL BY PETROLEUM VAPOR.

Accident recently revealed to the managers of the Baltimore Copper Works a fact which may have some value in refining the metal there handled. At this establishment the reverberating furnaces are connected with a great chimney by means of long underground passages, called "culverts," in which more or less oxydized copper, as well as sulphides, arsenides and other compounds, is carried off in the form of dust and smoke. These are deposited in the culverts, and are subsequently collected to be worked over again. Amid an accumulation of such stuff, a few days ago, there were found iridescent, mosslike masses, which upon examination proved to be pure copper. How the transformation was effected was a mystery, until it was discovered that petroleum, which saturated the soil in the vicinity (having escaped from a neighboring refinery) had entered the culverts through a crevice. Under the influence of high heat it was volatilized, and the resulting gases had "reduced" the oxides and sulphides into pure metal. It is probable that this revelation will be turned to advantage in future operations.

SAILING ON A BICYCLE.

HOW A CALIFORNIA MAN MAKES THE WIND DRIVE HIS MACHINE.

The expert bicyclist often finds a stiff breeze upon his back sufficiently powerful to keep him in motion without his applying any power on the pedals, and even enough to carry him up hill. If one may trust a story in "The San Francisco Examiner," this force is sometimes utilized by Charles D. White, of San Bernardino, in the manner indicated by our diagram. A light sail, made of sheeting and carried by a bamboo mast, has been placed on his wheel; and when the wind is in the right quarter he uses this instead of muscle, and is said to have thus made a speed of fifteen miles an hour.

In several respects such a mode of navigation differs considerably from yachting. You can't beat or even sail with a beam wind on a bicycle. You can only run straight before the wind. And there is room for doubt whether enough is gained, travelling in one direction, to pay for the bother of carrying the furled sail back home. Mr. White's rigging, however, adds only about seven pounds to the weight of his wheel.

The mast, which is set in a hard-pine block clamped to the tubing, is ten feet high, and the boom is eight feet long. If these dimensions were reduced to six and four feet respectively, Mr. White's imitators would probably find them adequate to their needs. It is also to be remembered that the "sheet" or cord controlling the outer end of the boom ought not to be tied fast to the machine, but run through a small pulley under the seat and kept in the hand. A sudden gust of wind is liable to lift the hind wheel off the ground unless the sheet is promptly eased off.

TO MEASURE INTENSE HEAT.

DIFFERENT CLASSES OF PYROMETERS.

Information has been sought from this department regarding pyrometers, or instruments for measuring temperatures beyond the range of ordinary mercurial thermometers. A dozen or more kinds of such instruments have been devised. Some of the earlier ones worked on the principle of the unequal expansion of two solids with heat. Daniell's did. Whitewell counted the number of seconds required to melt a zinc rod five-eighths of an inch in diameter; two and a half seconds meant 1,400 seconds Fahr., six seconds 1,100, seven 1,000, and so on. The melting point of zinc is given by some authorities as 782. Bell noted with a gauge the varying pressure of air in a copper tube expanded by heat. Regnault, the famous French chemist, invented two pyrometers, good for temperatures below that at which iron softens. One consisted of an iron tube through which hydrogen gas was passed over an oxide of copper, and the amount of water produced by the union of oxygen with the hydrogen indicated the heat which promoted the union. Regnault's other instrument was an iron bottle filled with mercury and provided with a valve in its neck. With expansion the quicksilver would overflow. Difference in weight before and after heating indicated the extent of that influence.

One of the pyrometers now in the market and registering (say the advertising catalogues) up to 5,000 degrees Fahr., employs the Saintignon system of a circulating fluid. Water is forced through an iron pipe swiftly enough to prevent evaporation and at a uniform rate. When entering and emerging, its temperature is taken by separate thermometers. The manufacturers not only supply self-recording apparatus, but also provide, when requested, a mechanism which merely shows the amount of difference, and not the water temperatures themselves.

With extreme heats advantage is taken of the increasing resistance offered to a current of electricity sent through a plantinum wire, wound on a porcelain cylinder and inclosed in an iron tube. Up to 1,800 degrees Fahr., such an instrument may be left in a furnace permanently; above that it must be inserted temporarily, say for three minutes, and thus a temperature higher than that of welding iron and near that of melting platinum may be registered. A perfect and trustworthy scale is attached to this pyrometer.

Still another instrument resembles the thermopile. Bars of different metals, platinum and iron or platinum and palladium, in close contact, give electric currents of varying intensity with varying temperature at the point of junction, and a galvanometer reveals the force of the current.

Professor Thomas Egleston, of the Columbia School of Mines in this city, who has tested nearly every modern form of pyrometer, expresses a preference for the type last described, and speaks highly of the Le Chatelier instrument, a platinum-rhodium couple, whose indications may be read several hundred feet away from the source of the heat which it tests.

ACHIEVEMENTS OF YANKEE SKILL.

Paper yarn is now being substituted for other cheap stock in carpets, and is said to be superior to "shoddy" and "mungo," both in cost and strength. Of course, the paper is used only in the body and on the underside of the texture, and not on the upper surface. It is said that 75 per cent of a carpet may be made of paper without a customer suspecting it.

The most extensive pneumatic tube system in the world, probably, is that which has recently been completed at Chicago. It extends from the headquarters of one of the great press news agencies to nearly all of the daily newspaper offices, and is to be used exclusively for sending messages to and from said offices. About seventeen miles of brass tubes three inches in diameter were used.

A steel barge has recently been tried on the Ohio River, in the coal traffic, this being the first experiment in that line. As a wooden vessel costs only $1,200 or $1,400, and a steel one of the same dimensions about $3,500 or $4,000, there would be no economy unless the latter would last longer; but it is believed that it will last about three times as long, and will not need repairs during the first half of its lifetime. A wooden barge after each trip may need repairs to any amount, and always must be caulked, at a cost of from $20 to $75. The most important advantage claimed for the steel barge is that it does away with pumping, which is a constant and large expense to the coal trade.

A sensation has been produced in Europe by the statement, at the World's Engineering Congress, in Chicago, a few weeks ago, that American mechanics used measuring instruments of far greater precision than were in vogue on the other side of the Atlantic. Professor Renteaux, who uttered this opinion, did not mean, however, to reflect on the skill of the foreigners who employed the instruments. He meant that they had not the same facilities as Americans.

The heaviest steel casting for marine work ever turned out in America is the steel "strut," to sustain the twin-screw shafts of one of the new American liners being built by the Cramps. It weighs over thirty tons—67,135 pounds—to be exact. "The Iron Age" says that while no trouble is encountered in "producing the largest castings called for by any of the designers, it is still extremely difficult to successfully make the smaller ones, where by reason of coring and limited quantity of metal it is almost impossible to avoid the blow holes and spongy spots which render them so unreliable."

FOREIGN WORK AND SCHEMES.

It is now two years since the new star in Auriga first became manifest in sky-photographs. Since then it has undergone many irregular fluctuations in brightness. At the Paris Observatory this was observed to diminish perceptibly in the latter part of last October, and then to increase up to November 8; but at that time it had not regained the brilliancy of October 10. Micrometric measurements by M. Bigourdan show that this star, which is now named Tau Aurigae, has not changed its position sensibly in eighteen months.

Thousands of photographs of lightning have been secured during the last few years, but until last month there was no known record, made in this way, of the globular form of lightning. Such a one is said to have been obtained by Dr. Kemphill, of Kingstown, England, on November 9, during a terrible storm. This negative exhibits both the ordinary sinuous flashes, and, on the surface of the sea, a number of fireballs, joined together by horizontal lines of light, and resembling "the course of a ball of wool played with by a kitten."

On French canals some boats have apparatus by means of which they pull themselves along, drawing in (and discharging behind) a chain cable that lies along the bottom of the canal. Formerly the machinery (previously described on this page) was worked by steam; but electricity has been used, with a trolley system, for the last two months on the Bourgogne Canal.

Not only has petroleum for fuel been adopted on many locomotives of the Great Eastern road, in England, but experiments are also being made with it in some of the great Lancashire cotton mills.

In France they are making much ado over a circular saw, with diamonds set in the teeth, for cutting stone. It is a good thing, but the idea originated in America and was patented here nearly thirty years ago.

A canal connecting the Elbe and Danube has been projected. It would start near Vienna, near Kornnenburg, extend 133 miles northwestward toward Budweis, and from the latter point the channels of the Moldau and Elbe would be "canalized" for 189½ miles. The greatest difference in level along the route is 1,312 feet. It is estimated that 80,000,000 florins ($32,000,000) would cover the cost.

PRICES UNDER FREE WOOL.

From The Rural New-Yorker.

Allowing the price for labor and the price of linings, trimmings and the materials that go to make up the finished suit or garments to remain unchanged, how much is free wool going to cheapen woollen clothing? A laboring man once answered this question by saying one-half, another from $2 to $3. A man who wore a broadcloth $75 suit thought free wool would reduce the cost of his suit $15 to $20. I have found that many have as vague, indefinite and incorrect ideas of the effect of free wool upon the prices as these answers indicate. Now, what are the facts? The duty upon merino and other wools which are used in making cloth for clothing, dress goods, underwear and hosiery is 11 cents per pound, and upon coarser wools for carpets 6 to 7 cents per pound. Now, with this fact before us, how much would the prices be changed or cheapened? Let me put it down, as seeing the figures is often convincing where words fail. Taking the weights given above, the difference on a heavy winter suit would be 60½ cents; on a light suit, 33 cents; on trousers, 16½ cents; on undershirt or drawers, from 4 to 6 cents; pair socks, 1 cent; woman's dress, 26 cents; child's flannel dress, 5½ cents; woman's or child's stockings, 1 to 2 cents a pair; broadcloth suit, 55 cents; one yard carpeting, 9 cents. These figures are based upon the supposition that all the cloths are made of wool only, but if the cloths have a mixture of cotton or shoddy, then these figures would all be less according as there is more shoddy and less wool.

Would this very slight difference in the cost of free wool clothing induce the people to buy so much more as to cause "great factories to spring up like magic," employing increased workmen enough to consume the extra amount of products which farmers, driven by free wool out of sheep raising, would have to grow to replace the losses caused by the annihilation of the sheep and wool industries? Would the small saving on woollen clothing be any compensation for the millions of loss that would accrue to the country by the destruction of 45,000,000 sheep and their product, which now give employment to hundreds of thousands? Texas alone has more than 100,000 engaged in sheep industries. Would free wool enable our manufacturers to export large quantities of cloth to sell in markets where they would come in competition with those nations who have not only free wool, but low wages?

THE FATHER OF CONGRESS.

From The Washington Post.

The very oldest man in Congress, the "father of Congress" in years, in original entry and in length of continuous service, is the Hon. Justin S. Morrill, who came to the House in 1855, served there until 1867, when he was promoted to the Senate, and has there remained ever since. He has the distinction of being both the father of the Congress and the father of the Senate. Mr. Morrill is in his eighty-fourth year, and if he shall live to serve out his present term he will have been in Congress forty-two years, thirty of which will have been spent in the Senate.

WHAT A CITY PASTOR SEES.

ITEMS OF PERSONAL INTEREST TO CHURCH PEOPLE.

Touching indeed were the addresses at the Memorial meeting held in the Church of the Strangers on Thursday evening. The labors of Dr. Charles F. Deems, so long the pastor of that church, were emphasized by clergymen and laymen representing several denominations. One of the most beautiful tributes was given by Marion J. Verdery, Dr. Deems's son-in-law, who spoke of the great preacher from the two-point view of a relative and friend. One of the addresses was given by Dr. Amory H. Bradford, who succeeds Dr. Deems as the head of the American Institute of Christian Philosophy. Dr. Bradford went to Cleveland on Saturday to take part in the dedication of a church and to speak on Forefathers' Day.

Dr. A. J. F. Behrends, of the Central Congregational Church, of Brooklyn, in a recent after-dinner address discussed the need of the study of the Bible by clergymen in Hebrew and Greek. He said that the critics of the Bible have retreated to the original tongues, and added: "We are bound to follow them." To show the young brethren that he was not presenting an impossibility, he said that in the last five years he had read his Hebrew Old Testament through twice and the Pentateuch a half dozen times. He began the study a long time after he had left the seminary, and after a year and a half of drudgery he had found it a most delightful occupation.

A meeting will be held this evening under the auspices of the New-York City Indian Association in the Calvary Baptist Church, at which Dr. R. S. MacArthur will preside. Addresses will be made by ex-Commissioner Morgan and the Rev. Charles J. Ryder, also by Dr. Montezuma and Dennison Wheelock, Indian graduates of Carlisle, Penn.

The Rev. A. C. Arnold, the efficient agent of the New-York Bible Society, who was run down by a runaway horse some weeks ago, has nearly recovered, and is now at his office again in the Bible House. The society has just issued its sixty-ninth annual report, in which it is shown that during a recent house-to-house canvass 171,570 families were visited, of these 81,638 were Roman Catholic, 29,029 Jewish and 60,903 Protestants. Of the latter, 5,410 were without a copy of the Scriptures, and were supplied in the language needed; 795 families were not only Protestant, but were not willing either to buy or to accept the Bible. The greatest destitution found was 37 per cent, in a district bounded by the Bowery, Eldridge, Grand and East Houston sts. It is in this part of the city that in a mile square a third of a million people live, and if the proportion found on some blocks was continued throughout the mile fully a million would live there.

The annual meeting of the New-York City Mission and Tract Society will be held in the First Presbyterian Church this evening. Those who desire to know what missionaries are doing will have an opportunity to hear it vividly described by practical workers.

Forefathers' Day will be celebrated this evening in the Lafayette Avenue Presbyterian Church, in Brooklyn, when Dr. David Gregg, the pastor, will preach on "The Scotch and Their Descendants as Makers of America." It has been generally understood that the Pilgrims and Puritans had something to do with the formative period of our country, but the subject would seem to indicate that they were rather coadjutors. The congregation will sing hymns set to Scotch tunes, and the quartet and chorus of forty voices will sing old-time music. Forefathers' Day has become an annual feature in this church. It is a splendid method for the culture of patriotism, and should be largely adopted by other churches.

At the Montreal Convention of Christian Endeavor last July President Clark, in his call for a great forward movement this year, emphasized as the first point, "Good Citizenship." Commenting on this address recently, the Rev. H. T. McEwen, of the Fourteenth Street Presbyterian Church, said: "I am heartily in favor of a deeper interest on the part of all decent people in our city in National as well as State affairs. We want, not politicians but patriots. The stay-at-home voter is the worst enemy we have; worse, in my judgment, even than the 'boodle' politician, because he makes the 'boodler' a possibility."

The Woman's Christian Temperance Union throughout the United States will observe December 23 as "Crusade Day," it being the twentieth anniversary of the Woman's Crusade.

The jubilee year of the Young Men's Christian Association will occur next summer. Fifty years ago, June 6, 1844, George Williams organized the first association in London. The World's Conference Committee has decided to celebrate this jubilee by holding the next triennial conference in connection with that anniversary in Exeter Hall, London. Already steps have been taken for an excursion party from the associations of this country. George A. Hall, State secretary of New-York, is in charge of these arrangements.

The German Theological School of Newark has sent out some seventy graduates, thirty of whom are German pastors in this city, Brooklyn, Hoboken, Newark and adjacent cities. Others are influential among the German people in Philadelphia, Scranton, Cincinnati, New-Orleans and smaller towns East and West. The seminary proposes to add a fourth year to its theological course, which will be a "pastoral year," in which the students of that class shall be practically trained in city mission work in New-York and its metropolitan district. There are now forty-four young men studying for the ministry. The dormitory is too small for this number. The lecture-rooms are insufficient, and neither the chapel nor the library is sufficiently large for the demands made upon it. Either a new building for a library, chapel and classrooms, and a renovation of the present building for dormitory, or a generous enlargement of the edifice now in use, is a pressing need. Further information may be obtained from the president of the school, Dr. Charles E. Egan, Bloomfield, N. J.